US008205762B2

(12) **United States Patent**
Carroll

(10) **Patent No.: US 8,205,762 B2**
(45) **Date of Patent: Jun. 26, 2012**

(54) **SAFETY CAP ASSEMBLY AND CONTAINER SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 773 days.

(21) Appl. No.: **12/245,502**

(22) Filed: **Oct. 3, 2008**

(65) **Prior Publication Data**

US 2009/0095700 A1 Apr. 16, 2009

Related U.S. Application Data

(60) Provisional application No. 60/978,127, filed on Oct. 7, 2007.

(51) **Int. Cl.**
B65D 55/02 (2006.01)

(52) **U.S. Cl.** **215/222**; 215/211; 215/215; 215/220; 215/330; 215/342; 222/521

(58) **Field of Classification Search** 215/211, 215/214, 216–223, 317, 318, 334, 337, 339, 215/342, 43, 44, 46, 204, 213, 277, 301, 215/315, 329–332; 401/126, 127; 220/254.1, 220/254.2, 254.7–254.9, 256.1, 259.3–259.5; 222/91, 153.02, 153.04, 153.1
See application file for complete search history.

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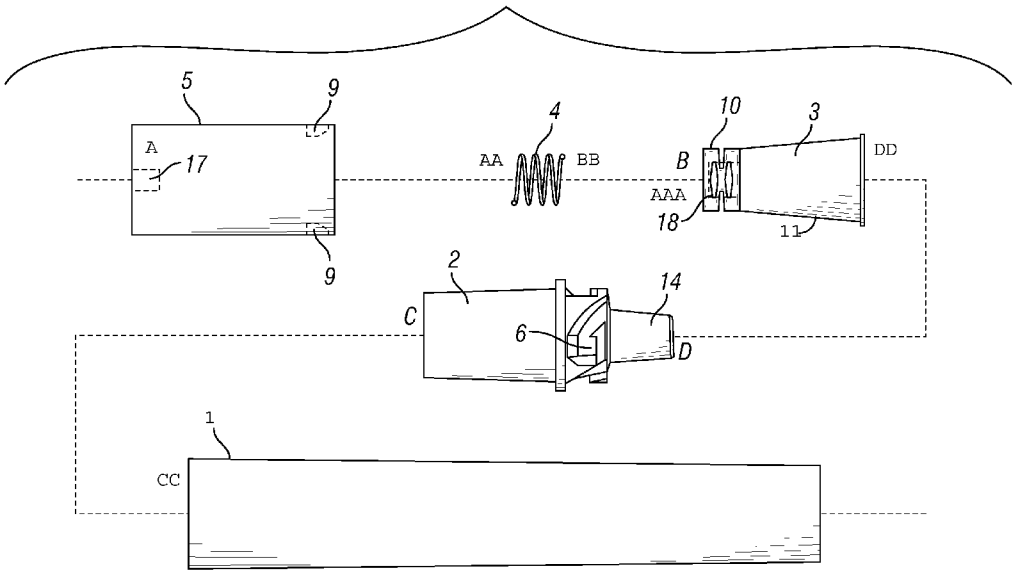
(57) **ABSTRACT**

Disclosed is a safety cap assembly and corresponding container. The container may feature recessed projections which have notches and the cap may feature a flexor and lugs wherein the lugs interact with the notches under a force from the flexor to prevent removal of the cap by pulling or twisting.

6 Claims, 4 Drawing Sheets



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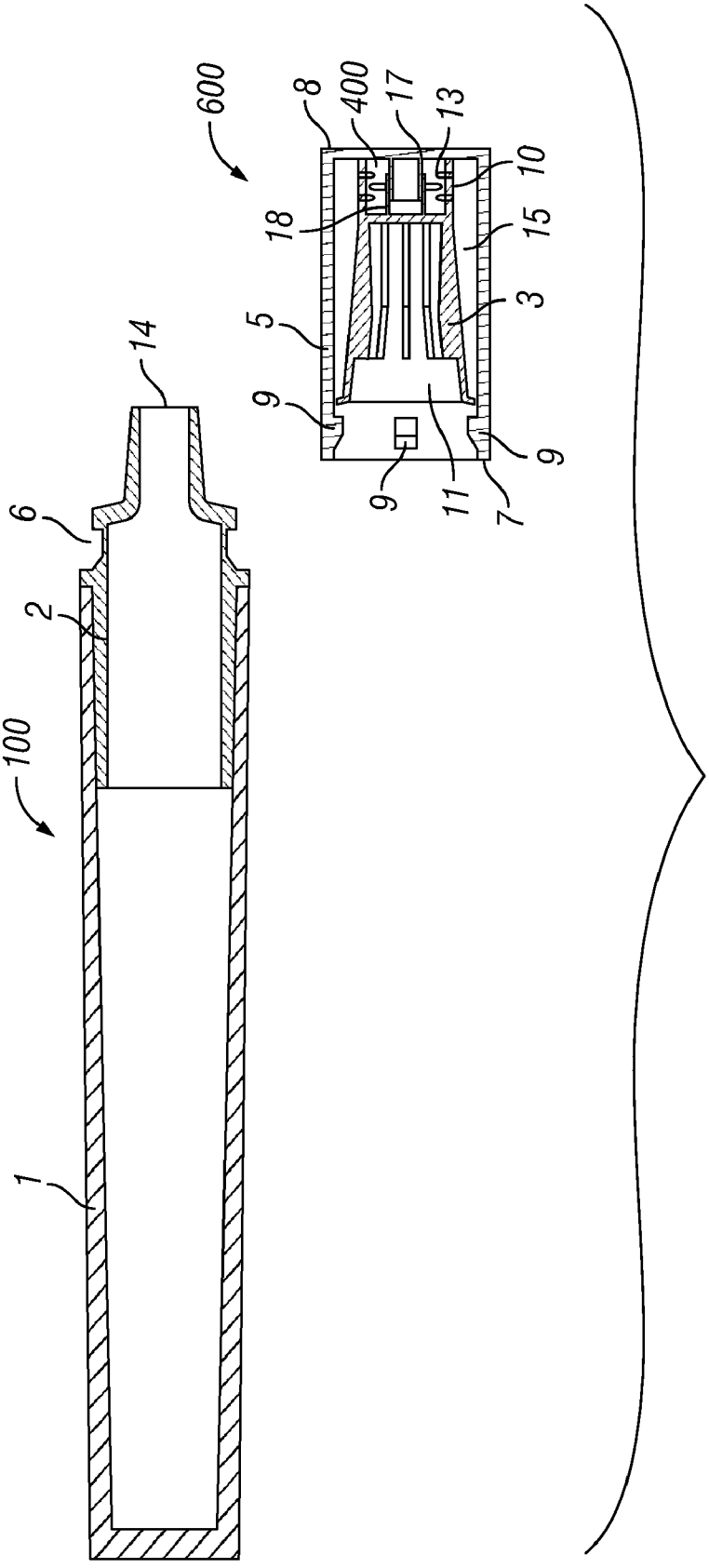

FIG. 1

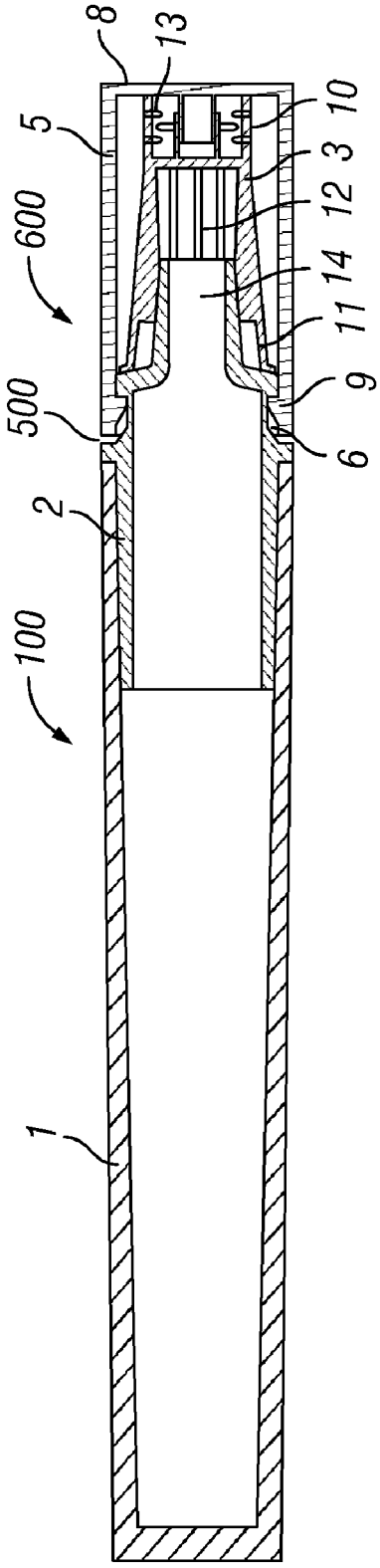

FIG. 2

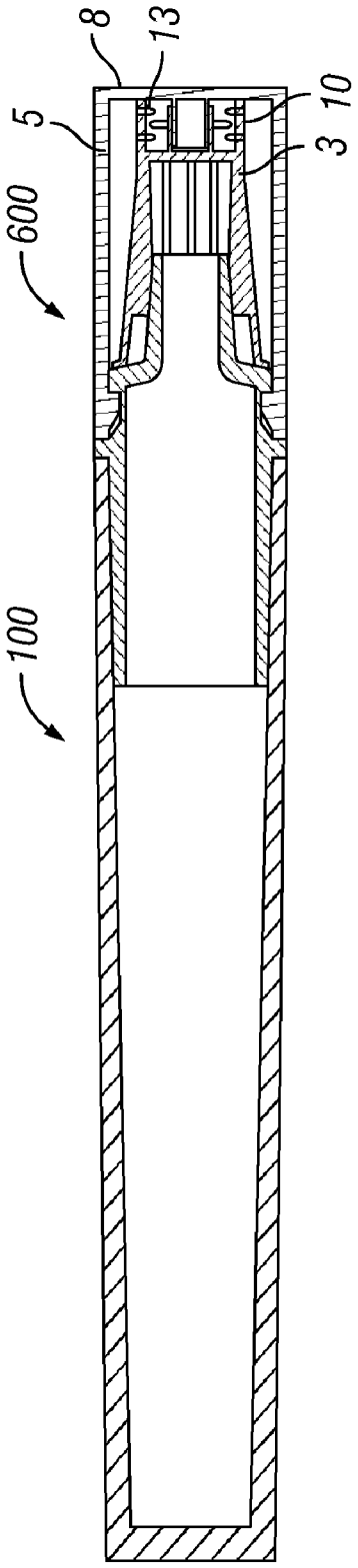

FIG. 3

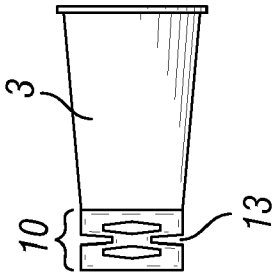

FIG. 6

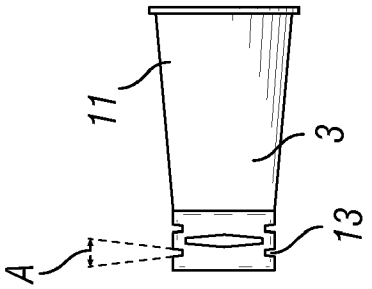

FIG. 5

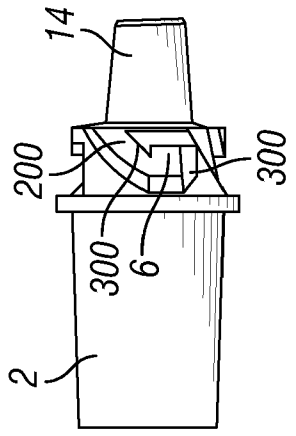

FIG. 4

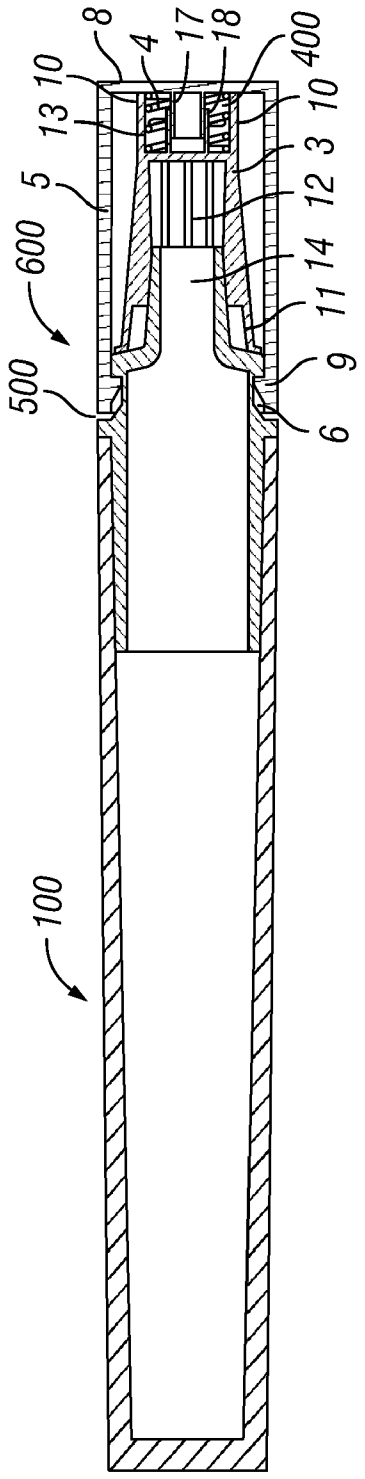

FIG. 7

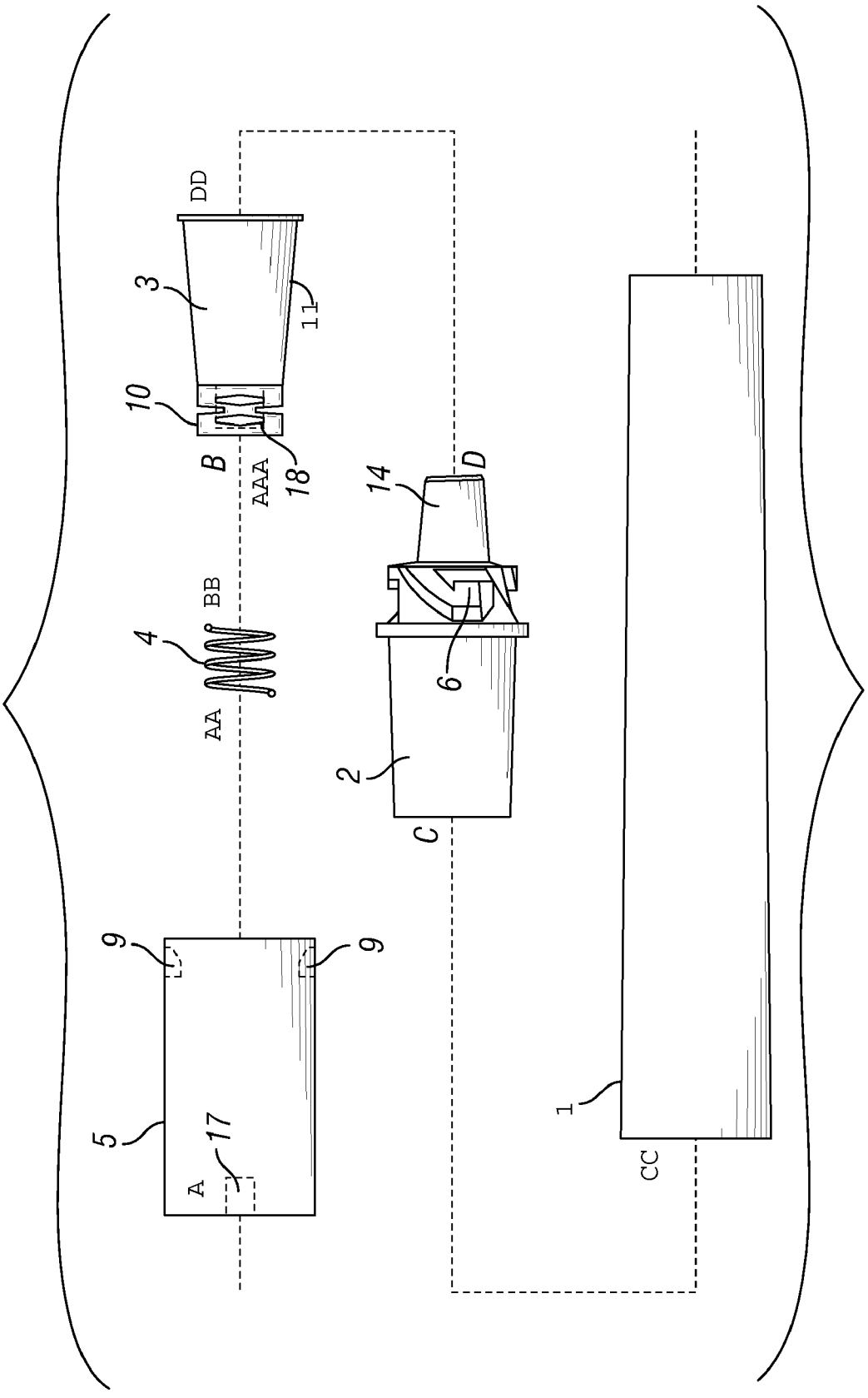

FIG. 8

SAFETY CAP ASSEMBLY AND CONTAINER SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

The present utility application claims priority from U.S. provisional patent application No. 60/978127 entitled "Safety Cap and Container System" and filed on Oct. 7, 2007.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not applicable.

BACKGROUND OF THE INVENTION

1. Field of Invention

The present application is in the field of safety caps and containers.

2. Background of the Invention

Many hazardous substances are useful around the home, office, work space, and/or garage. Ideally, these substances would be readily accessible for capable users, while at the same time inaccessible to others unable to handle the responsibilities associated with such substances (for example, small children).

SUMMARY OF THE INVENTION

Accordingly, it is an objective of the present application to provide a safety cap and container which resists opening by children. Specifically, it is the object of the invention to provide a safety cap which cannot be simply pulled apart or removed by a simple rotation.

It is a further object of the present application to provide a safety cap having an optional compression member which increases the axial force required to remove the cap from a cooperating container.

BRIEF DESCRIPTION OF THE FIGURES

Other objectives of the invention will become apparent to those skilled in the art once the invention has been shown and described. The manner in which these objectives and other desirable characteristics can be obtained is explained in the following description and attached figures in which:

FIG. **1** is a cross-section of the cooperating container **100** and safety cap **600** disassociated to permit access to a contained substance.

FIG. **2** is a cross-section of the cooperating container **100** and safety cap **600** intimately interlocked to prevent routine access to a contained substance.

FIG. **3** is a cross-section of the cooperating container **100** and safety cap **600** compressed in transition between the FIG. **1** and FIG. **2** positions.

FIG. **4** is a side perspective view of the adapter **2** of the cooperating container **100**.

FIG. **5** is a side perspective view of the inner cap **3** of the safety cap **600**.

FIG. **6** is a side perspective view of the inner cap **3** depicted in FIG. **5**, rotated by 90 degrees.

FIG. **7** is a cross-section of the cooperating container **100** and safety cap **600** of FIG. **1** with the additional feature of a compressible member **4**.

FIG. **8** is the exploded cooperating container **100** and safety cap **600** of FIG. **7**. FIG. **8** is meant to illustrate and inventory some of the individual components of the safety cap **600** and container **100** system, while also representing a plan for fitting various components together to construct the safety cap **600** and container **100** of FIG. **7**.

It is to be noted, however, that the appended figures illustrate only typical embodiments of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments that will be appreciated by those reasonably skilled in the relevant arts. Also, figures are not necessarily made to scale but are representative.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

FIG. **1** illustrates the cooperating container **100** and safety cap **600** dissociated to allow access to a contained substance. Typically, the container **100** features a body **1** with an adapter **2** assembled therein. The adapter **2** provides an exit **14** for a contained substance, and features a number of circumferentially spaced radially recessed projections which have notches **6** therein. In the present embodiment, the safety cap **600** is primarily defined by two structures: (1) an outer cap **5** suitably defined by a one piece hollow cylinder having an open base **7** with a closed top **8**, a hollow **15**, a number of circumferentially spaced lugs **9** extending radially inward at the cap hollow **15**, and a rigid axial extension **17** at the inside of the top **8**; and, (2) an inner cap **3** which is typically configured at one end **11** to accommodate the exit **14** when the adapter **2** is inserted therein, and defined at the other end by a flexor **10** and acceptor **18** which are separated by an inside cavity **400**. The inner cap **3** is fixedly and slidably assembled concentrically within the outer cap **5** at the hollow **15** by interaction between the extension **17** and the acceptor **18**. The flexor **10** features vents **13** which produce a spring force when the flexor **10** is compressed. The interaction between the extension **17** and acceptor **18** is typically such that the flexor **10** abuts the inside of top **8** and can be electively compressed thereagainst or fully extended therefrom. However, while in equilibrium, the flexor **10** will usually be fully extended due to the spring force provided by the vents **13** against compression.

Routine access to a contained substance usually occurs when a cap may be simply pulled or rotated for removal (or any other non-prophylactic cap removal method). FIG. **2** illustrates a container **100** and safety cap **600** intimately interlocked to prevent routine access to a contained substance. In this figure, the safety cap **600** is situated over the exposed end of the adapter **2** with the body **1** extending distally. As discussed further below, the lugs **9** on the inside of the outer cap **5** are cooperating with the corresponding notches **6** to prevent safety cap **600** removal by twisting (i.e., safety cap **600** radial movement) or pulling (i.e., safety cap **600** axial movement away from the body **1**). The exit **14** on the adapter **2** is covered by the adapted end **11** of the inner cap **3** and the flexor **10** is partially compressed. The spring force delivered by vents **13** as a result of the partial flexor **10** compression, pushes the adaptor **2** at the adapted end **11** of the inner cap **3**, and pulls lugs **9** on the outer cap **5** against the notches **6** in the adapter **2**. Thus, the existence of space **500** and a constant resistance to axial cap **600** movement toward the body **1**. The adapted end **11** of the inner cap **3** may suitably contain a number of ribs **12** to support compressive forces.

FIG. **3** illustrates the container **100** and safety cap **600** of FIGS. **1** and **2** wherein the flexor **10** is compressed while the safety cap **600** is displaced axially toward the body **1**. Such flexor compression may be accomplished by asserting an

axial external force at the body toward the safety cap **600** (which acts primarily on the inner cap **3**), and by applying an opposing force at the cap top **8** (which acts primarily on the outer cap **5**), whereby the resulting force is sufficient to overcome the spring force of the vents **13** to result in flexor **10** compression. As discussed in greater detail below, when a compression force sufficiently depletes space **500**, safety cap **600** may be torqued relative to the adapter **2** to effectuate safety cap **600** removal. When such compressing force is dissipated without safety cap **600** removal, the spring force delivered by vents **13** returns the safety cap **600**/container **100** system to the FIG. **2** position.

FIG. **4** is a side view of adapter **2**, and when viewed in conjunction with FIGS. **1**, **2** and **3** illustrate safety cap **600** placement and removal. Beginning with FIGS. **1** and **4**, cap placement is accomplished as follows: safety cap **600**, in equilibrium, is positioned over adapter **2** such that lugs **9** align to engage the corresponding lug paths **200** and exit **14** is accepted by adapted end **11** of the inner cap **3**; a torque and compressive force are simultaneously applied to the system whereby the adapter **2** presses on the inner cap **3** to compress flexor **10**, and whereby lugs **9** traverse the tapered lug paths **200** until the safety cap **600** and container are in the FIG. **3** position; the compressive force is released, thereby allowing the spring force of the flexor **10** to drive the system to its FIG. **2** position. The notches **6** prevent safety cap **600** removal from simple pulling, and the stop **300** prevents cap **600** rotation. Beginning with FIGS. **2** and **4**, safety cap **600** removal is accomplished as follows: a compressive force is applied to the system whereby the adapter **2** presses on the inner cap **3** to compress flexor **10** to the FIG. **3** position; a torque is added simultaneous with the release of the compressive force, whereby the spring force of the flexor **10** drives the safety cap **600** along the lug paths **200** until the flexor **10** achieves equilibrium; the exit **14** is removed from the inner cap and the safety cap **600** and container **100** are separated.

FIGS. **5** and **6** are a side view of the inner cap of the present embodiment rotated by 90 degrees with respect to each other. These figures depict the dichotomy between the first end **11** adapted to receive the adapter exit **14** and the flexor **10** in the inner cap **3**. These figures also depict a suitable embodiment of flexor **10** and the associated vents **13**. When the flexor **10** is compressed, gap(s) A is substantially shut. The inner cap **3** is made from a suitable plastic material which provides the desired flexibility and resiliency. Such material will be readily apparent to those skilled in the applicable art.

FIG. **7**, like FIG. **2**, illustrates a container **100** and safety cap **600** intimately interlocked to prevent routine access to a contained substance. However, FIG.**7** contains the additional feature of a compression member **4** positioned between the flexor **10** and acceptor **18** at the inside cavity **400**. The compression member **4** is sandwiched between to inside of the external cap top **8** and the top of the internal cap **3**. The compression member **4** supplements flexor **10** and adds additional resistance to flexor **10** depression. Accordingly, a safety cap **600** featuring a compression member increases the axial force necessary to remove the safety cap **600** when in a FIG. **7** position. Other than the increased resistance to flexor **10** depression, safety cap **600** placement and removal are accomplished in substantially the same manner discussed above.

FIG. **8** is an exploded view of a typical safety cap **600** and container **100** embodiment contemplated by the present application. This figure is meant to provide an inventory of necessary components, and provide a crude assembly guide. The figure includes a compressible member **4**, but embodiments not featuring such compressible member are assembled in substantially the same manner. Following the dashed line generally from the bottom left to the top right of the figure, assembly is accomplished as follows: the rigid axial extension **17** is masculinely inserted into the compression member **4** (A to AA); the acceptor **18** in the internal cap **3** masculinely inserts into the compression member **4** (B to BB), but femininely receives the rigid axial extension **17** (A to AAA)until the flexor **10** abuts the inside of the external cap top **8**; the body, femininely receives the male end of adapter **2** (C to CC); and, Finally, the safety cap **600** is positioned or removed as discussed above (D to DD).

In general then, the invention of the present application is a cap comprising a compressible member, and a means for electively coupling said cap over the opening of an affiliated container, said means activated via compression of said compressible member.

I claim:

1. A container system comprising:

a container comprising:

a body operationally configured to house a substance;

a dispensing adapter for dispensing said substance from said body, said dispensing adapter having:

a lug path having a notch, and

an outlet;

a safety closure comprising:

a removable outer cap having:

a skirt, and,

a lug disposed on an interior surface of said skirt, said lug configured to cooperate with said notched lug path;

an inner cap having:

a compressible end having six tessellatedly and mirroredly positioned vents, and said compressible end is a flexor, and

a lower end configured to engage said outlet;

a spring configured to resist compressing said compressible end;

wherein coupling the closure to the container requires engaging said removable outer cap with said dispensing adapter to close said outlet and compressing said compressible end to move the lug along the lug path into the notch; and,

wherein uncoupling the closure from the container requires compressing said flexor to release the lug from the notch of the notched lug path.

2. The container system of claim **1**, wherein said safety closure is removable.

3. The container system of claim **1**, wherein the spring is positioned within the compressible end of the inner cap.

4. The container system of claim **1**, wherein said notched lug path is tapered.

5. The container system of claim **1**, wherein said association of the lug and the notch of the notched lug path is configured to prevent a disengagement of said inner cap from said dispensing adapter by pulling or twisting.

6. The container system of claim **1**, wherein said vents are positioned around the periphery of the compressible end.

* * * * *